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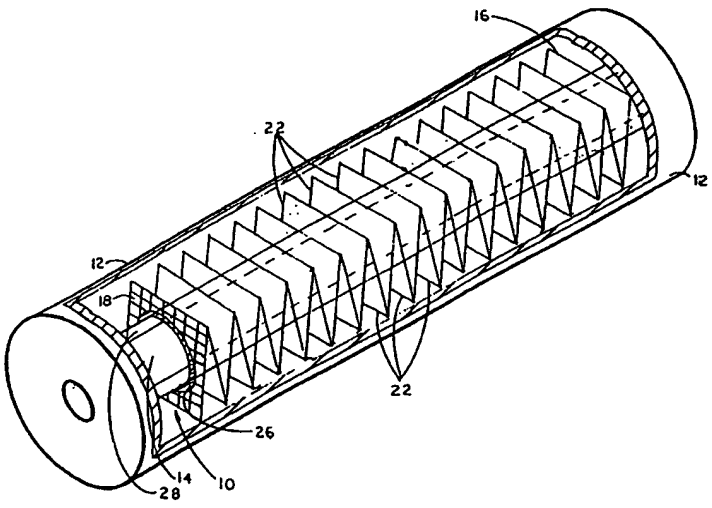
[Continued on next page]

(54) Title: PHOTOLYTIC AND PHOTOCATALYTIC REACTION ENHANCEMENT DEVICE



(57) Abstract: A photolytic and photocatalytic reaction enhancement device (10) comprising a catalyst coated, fluid permeable fixed-substrate material (16) preferably constructed of either pure titanium or tungsten or their alloys that is oxidized or anodized to form a titanium dioxide or tungsten oxide layer, respectively, or a corrosion-resistant metal alloy that can be coated with a photocatalyst. In a preferred embodiment, the substrate (16) may be a glass, polymeric or ceramic composition containing micropores, channels or conduits which receive oxidizing, reducing and/or pH agents. The catalyst is a semiconductor such as TiO_2, WO_3, Fe_2O_3, or titanate-based materials compatible with the process and may be metallized. The structure and configuration of the substrate (16) each serve to optimize both photocatalyst surface area and turbulence of the target fluid within the maximum UV illumination area of the reaction chamber (13), thereby enhancing photocatalytic reactivity. The substrate (16) is generally comprised of a length of mesh or cloth-like material which, in the preferred embodiment is folded or "pleated" in accordion-like fashion. A plurality of panels (18) are created by the folding, each being adapted with a centrally located aperture (20) for slidable reception of the UV light source (24) there through. The edges of each aperture (20) may be optionally modified with a special coating to prevent damage to the scratch-prone outer surface of the UV source (24) as well as actually clean the surface through manual contraction and extension of the accordion-like substrate (16). Alternatively, a UV transmissive sleeve (28) may be employed between the UV source surface and the subject invention. The subject device (10) may be removably installed within conventional and more novel, commercially available UV chambers without modification thereof or the use of invasive mounting means.

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INTERNATIONAL SEARCH REPORT

Inter. ...nal Application No
PCT/US 01/09051

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B01J19/12 B01J19/24 C02F1/32 B01J35/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B01J C02F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
WPI Data, EPO-Internal, PAJ, API Data, CHEM ABS Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 790 934 A (JAMES SAY ET AL.) 4 August 1998 (1998-08-04) column 2, line 21 - line 61 column 5, line 52 - line 65 column 8, line 24 - line 49 figure 6 ---	1-19
A	EP 0 306 301 A (ROBERT B. HENDERSON) 8 March 1989 (1989-03-08) abstract page 2, line 49 -page 3, line 11 page 3, line 30 -column 49 page 5, line 16 - line 27 figure 2 --- -/--	1-19

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

* Special categories of cited documents :

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
12 October 2001	27. 02. 2002

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	STEVNSBORG, N

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INTERNATIONAL SEARCH REPORT

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PCT/US 01/09051

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 993 859 A (HITACHI METALS, LTD. & TAO INC.) 19 April 2000 (2000-04-19) column 2, line 43 -column 3, line 2 column 7, line 3 - line 31 column 11, line 41 - line 12; figure 2 figure 14 -----	1-19

1

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 01/09051

Box I Observati ns where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-19

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-19

   Photolytic reaction enhancement device.

2. Claim : 20

   Photocatalytic composition.

INTERNATIONAL SEARCH REPORT

Information on patent family members

Inte...onal Application No
PCT/US 01/09051

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